WORKSHEET ANSWERS
HUMAN RESPIRATORY SYSTEM

Name _____ Period _____ Date _____

A. Background Reading

When a person breathes in, air enters the respiratory system through the nose and sometimes through the mouth, and is warmed and moistened by the mouth cavity or by the twin **nasal passages**, chambers that open into the throat, or **pharynx**. The pharynx branches into the esophagus (the food tube to the stomach) and to the airways. At the beginning of the airways is the **larynx**, or "voice box," which houses the vocal cords. There is a flap of tissue above the opening of the larynx called the epiglottis that covers the larynx during swallowing to prevent food from accidentally entering the lungs and choking the person.

The larynx opens into the **trachea**, or windpipe, which is about as wide as a garden hose. Just below the larynx the trachea branches into two smaller airways called **bronchi** (singular, bronchus), each of which enters a lung. Finer and finer branching of the bronchi create an "upside down tree," with thousands of narrowed airways called **bronchioles**. The bronchioles eventually lead to millions of tiny, "grape-shaped" sacs called **alveoli** (singular, alveolus), where the oxygen-carbon dioxide gas exchange occurs. There are about 300 million alveoli in the human lungs, which if flattened, would cover an area that is the size of a tennis court!

When an air pollutant such as particulate matter (dust, sand, etc.) is inhaled, they travel through a filtering system of nasal hairs, mucus-coated linings, and twisted airways. **Mucus** is a sticky and glutinous substance that is made from the mucus membrane lining in the respiratory system. Large particles are stopped by the nasal hairs and in the mucus-lined nasal passages. Smaller particles bypassing the nasal passages are trapped in the mucus lining from the trachea to the bronchiole airways. These characteristics of the respiratory system help keep all but the smallest particles out of the deepest part of the lungs where they can do the most damage.

There are several ways trapped particles are removed from the airways. They are by sneezing, coughing, and the mucus escalator. Sneezing expels the particles from the nasal region and coughing removes particles from the upper bronchi on up into the mouth where they can be expelled or swallowed. The mucus escalator involves **cilia** (singular, cilium), which are tiny hair-like structures that line the respiratory system, from the nose down through the smallest bronchiole. The cilia act like brooms and sweep the mucus and any mucus-trapped debris up toward the mouth, to be swallowed or expelled.

Various air pollutants that are inhaled in high enough concentrations can irritate the mucus-lining causing excess mucus to be produced and cilia to be overworked, which can lead to obstruction (partial closing) of the airways. If exposure is over a long period of time, cilia and cells in the mucus lining can eventually die, resulting in patches of scar tissue where excess mucus can build-up and cause continual breathing difficulties.

B. Using the information provided in the Background Reading section, answer the questions below in complete sentences:

1. What is the term given to the many smaller airways that branch off from the two bronchi?

The term given to the many smaller airways that branch off from the two bronchi is the bronchiole.

2. What important process occurs in the alveoli?

The important process that occurs in the alveoli is the oxygen-carbon dioxide gas exchange.

3. What is mucus?

Mucus is a sticky and glutinous substance that is made from the mucus membrane lining in the respiratory system.

4. What are three ways in which trapped particles can be removed from the airways?

Trapped particles can be removed from the airways by sneezing, coughing, and the mucus escalator.

5. What is the function of cilia?

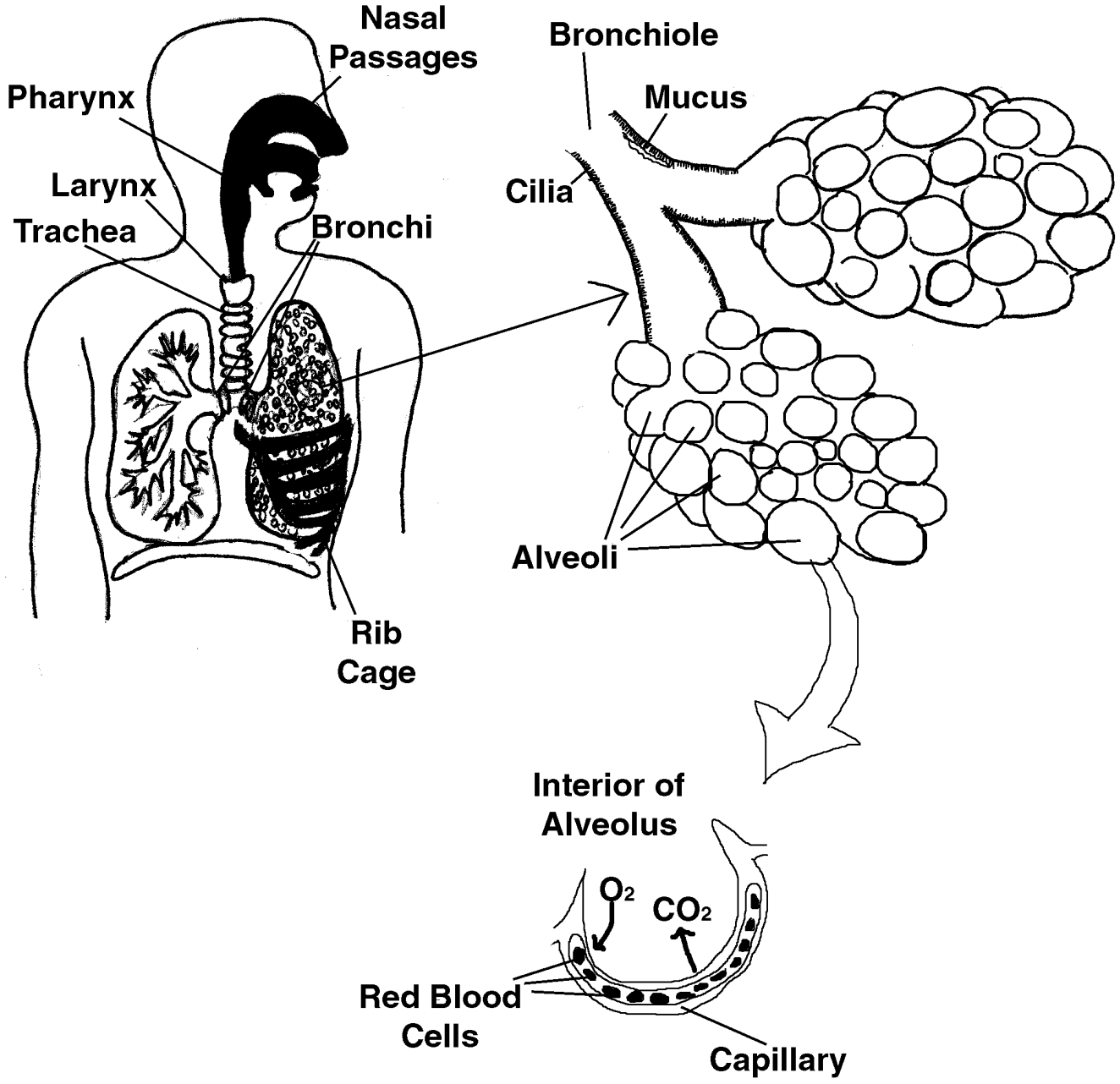
The function of cilia is to sweep the mucus and any mucus-trapped debris up toward the mouth to be swallowed or expelled.

6. What can happen to the mucus lining and cilia of the airways if a high enough concentration of an air pollutant is inhaled?

The mucus lining can make excess mucus and the cilia can be overworked, which can lead to obstruction (partial closing) of the airways.

C. Using the terms and space provided below, draw and label the major parts of the human respiratory system.

Nasal Passages	Pharynx	Larynx	Trachea
Bronchus	Bronchiole	Alveolus	Cilia
Mucus			



D. Using the terms and space provided below, draw and label a cross section of a normal bronchiole and a cross section of a obstructed bronchiole:

Normal Bronchiole	Bronchiole Muscle	Obstructed Bronchiole
Mucus	Thick Secretions